

EXHIBIT S

Amendments to the Claims:

This listing of claims will replace all prior versions, and listings of claims in the application:

Listing of Claims:

1. (Currently Amended) A method for generating a modified virtual model of a patient's teeth, comprising:

displaying, on a display operatively connected to a computer system, an image of a first virtual model, wherein the first virtual model is generated from first 3D intraoral scan data of the teeth, and wherein the first virtual model includes a portion that is a deficient representation of a first physical portion of the teeth;

receiving an identification of the portion of the first virtual model that is the deficient representation of the first physical portion of the teeth;

obtaining, by an intraoral scanner, ~~a second virtual model of the teeth with the computer system, the second virtual model generated from~~ second 3D intraoral scan data of the teeth, the second 3D intraoral scan data including surface data of the portion that is physically changed; and

modifying, by the computer system, the first ~~virtual model~~ 3D intraoral scan data by replacing at least the first 3D intraoral scan data of the identified portion of the first virtual model that is a deficient representation of the first physical portion of the teeth with a corresponding portion of the second ~~virtual model~~ 3D intraoral scan data that provides an adequate representation of the first physical portion and including the surface data of the portion that is physically changed, thereby generating the modified virtual model; and

wherein the at least the identified portion of the first virtual model is of the first physical portion of the teeth, and the corresponding portion of the ~~second virtual model~~ second 3D intraoral scan data is also of the first physical portion of the teeth.

2-3. (Canceled)

4. (Currently Amended) The method according to claim 1, further comprising manufacturing, based on the modified virtual model, at least one of a physical dental model of an intra-oral cavity, a dental aligner, an orthodontic appliance, or a dental prosthesis.

5. (Original) The method according to claim 1, further comprising designing an orthodontic treatment plan based on the modified virtual model.

6. (Previously Presented) The method according to claim 1, wherein the first virtual model includes a first 3D virtual model representative of the first physical portion of the teeth, and the displaying step comprises receiving the first 3D virtual model at the computer system and displaying on the display a first display image corresponding to the first 3D virtual model.

7. (Currently Amended) The method according to claim 6, wherein receiving the identification of the portion of the first virtual model that is a deficient representation of the first physical portion of the teeth further comprises ~~comprising~~ a step of receiving user input identifying on the first display image at least a first display image portion thereof generated by user interaction with the display, wherein the first display image portion includes the portion of the first virtual model that is the deficient representation of the first physical portion of the teeth, and wherein the at least the physical portion of the first virtual model replaced in the modifying step corresponds to the identified physical portion.

8. (Currently Amended) The method according to claim 7, wherein the obtaining and modifying steps comprise, subsequent to the receiving step:

causing the computer system to at least one of delete, remove, or replace the identified portion of the first virtual model by applying a corresponding function to the first display image portion via interaction with the first display image on the display, to provide a modified first 3D virtual model;

obtaining the ~~second virtual model in the form of a second 3D virtual model~~ intraoral scan data representative of a second physical portion of the teeth, includes obtaining the

second 3D intraoral scan data, wherein a spatial disposition of the second physical portion with respect to the first physical portion is known or determinable;

virtually registering the second 3D intraoral scan data ~~virtual model~~ with respect to the ~~modified~~ first 3D intraoral scan data ~~virtual model~~ to provide the modified virtual model wherein the identified portion of the first virtual model is replaced with the corresponding portion of said second 3D intraoral scan data ~~virtual model~~ representative of ~~[[a]]~~the second physical portion; and

outputting the modified virtual model from the computer system.

9. (Previously Presented) The method according to claim 8, wherein the first virtual model represents the first physical portion of the teeth, wherein the first virtual model is considered to fail to comply with a predetermined requirement, wherein the predetermined requirement comprises providing high surface definition of a surface of interest in the first physical portion of the teeth.

10. (Currently Amended) The method according to claim 9, wherein at least a part of the surface of the first physical portion was obscured by soft tissue or materials when the first 3D virtual model was created, and wherein the second physical portion ~~of the second physical part~~ corresponds to the first physical portion ~~of the first physical part~~ wherein the soft tissue or materials are removed from at least the part of the surface of the first physical portion ~~is now unobscured by soft tissue or materials~~.

11. (Currently Amended) A system to generate a modified virtual model of a patient's teeth, comprising:

a display to display images of the modified virtual model; and

a computer system operatively connected to the display and comprising a program that, when executed by the computer system, causes the computer system to:

display an image of a first virtual model on the display, wherein the first virtual model is generated from first 3D intraoral scan data of the teeth, and wherein the first

virtual model includes a portion that is a deficient representation of a first physical portion of the teeth;

receive an identification of the portion of the first virtual model that is the deficient representation of the first physical portion of the teeth;

~~obtain a second virtual model of the teeth with the computer system, the second virtual model generated from~~ second 3D intraoral scan data of the teeth, the second 3D intraoral scan data including surface data of the portion that is physically changed; and

modify the first ~~virtual model~~ 3D intraoral scan data with the computer system by replacing at least the first 3D intraoral scan data of the identified portion of the first virtual model that is a deficient representation of the first physical portion of the teeth with a corresponding portion of the second virtual model 3D intraoral scan data that provides an adequate representation of the first physical portion of the teeth and including the surface data of the portion that is physically changed, thereby generating the modified virtual model; and

wherein the at least the identified portion of the first virtual model is of a first physical portion of the teeth, and the corresponding portion of the ~~second virtual model~~ second 3D intraoral scan data also of the first physical portion of the teeth.

12-13. (Canceled)

14. (Currently Amended) The system according to claim 11, wherein the system is further configured to generate instructions based on the modified virtual model to manufacture at least one of a physical dental model of an intra-oral cavity, a dental aligner, an orthodontic appliance, or a dental prosthesis.

15. (Original) The system according to claim 11, wherein the system is further configured to design an orthodontic treatment plan based on the modified virtual model.

16. (Previously Presented) The system according to claim 11, wherein the first virtual model includes a first 3D virtual model representative of the first physical part of the teeth, and

displaying the image comprises receiving the first 3D virtual model at the computer system and displaying on the display a first display image corresponding to the first 3D virtual model.

17. (Previously Presented) The system according to claim 16, wherein the instruction to receive the identification of the portion of the first virtual model that is a deficient representation of the first physical portion of the teeth are further configured to cause the system to receive user input identifying on the first display image at least a first display image portion thereof generated by user interaction with the display, wherein the first display image portion includes the portion of the first virtual model that is the deficient representation of the first physical portion of the physical teeth.

18. (Currently Amended) The system according to claim 17, wherein the system is configured to:

cause the computer system to at least one of delete, remove, or replace the identified at least the portion of the first virtual model by applying a corresponding function to the first display image portion via interaction with the first display image on the display, to provide a modified first 3D virtual model;

obtain the ~~second virtual model in the form of a second 3D virtual model~~ intraoral scan data representative of a second physical portion of the teeth, includes obtaining the second 3D intraoral scan data, wherein a spatial disposition of the second physical portion with respect to the first physical portion is known or determinable;

virtually register the second 3D intraoral scan data ~~virtual model~~ with respect to the ~~modified~~ first 3D intraoral scan data ~~virtual model~~ to provide the modified virtual model wherein the identified portion of the first virtual model is replaced with the corresponding portion of said second 3D intraoral scan data ~~virtual model~~ representative of a second physical portion; and

output the modified virtual model from the computer system.

19. (Previously Presented) The system according to claim 18, wherein the first virtual model represents the first physical portion of the teeth, wherein the first virtual model is

considered to fail to comply with a predetermined requirement, wherein the predetermined requirement comprises providing high surface definition of a surface of interest in the first physical portion of the teeth.

20. (Currently Amended) The system according to claim 19, wherein at least a part of the surface of the first physical portion was obscured by soft tissue or materials when the first 3D virtual model was created, and wherein the second physical portion ~~of the second physical part corresponds to the first physical portion of the first physical part~~ wherein the soft tissue or materials are removed from at least part of the surface of the first physical ~~portion is now unobscured.~~

21. (Currently Amended) A system to generate a modified virtual model of a patient's teeth, comprising:

an intraoral scanner; and

a non-transitory computer readable medium including instructions that, when executed by a computer system, ~~causes~~ cause the computer system to:

display an image of a first virtual model on a display, wherein the first virtual model is generated from first 3D intraoral scan data of the teeth, and wherein the first virtual model includes a portion that is a deficient representation of a first physical portion of the teeth;

receive an identification of the portion of the first virtual model that is a deficient representation of the first physical portion of the teeth, second 3D intraoral scan data including surface data of the portion that is physically changed;

~~obtain a second virtual model of the teeth with the computer system, the second virtual model generated from the second 3D intraoral scan data of the teeth; and~~

modify the first ~~virtual model~~ 3D intraoral scan data with the computer system by replacing at least the first 3D intraoral scan data of the identified portion of the first virtual model that is the deficient representation of the first physical portion of the teeth with a corresponding portion of the second ~~virtual model~~ 3D intraoral scan data that provides an

adequate representation of the first physical portion of the teeth and including the surface data of the portion that is physically changed, thereby generating the modified virtual model; and

wherein the portion of the first virtual model is of the first physical portion of the teeth, and the corresponding portion of the second ~~virtual model~~ 3D intraoral scan data is also of the first physical portion of the teeth.

22. (Currently Amended) The system according to claim 21, wherein instructions that when executed by a computer system, ~~causes~~ cause the computer system to receive an identification of the portion of the first virtual model that is the deficient representation of the first physical portion of the teeth, further cause the system to:

receive user input identifying on the image of the first virtual model at least the portion of the first virtual model, wherein the portion includes the portion of the first virtual model that is the deficient representation of the first physical portion of the physical teeth, and wherein the portion of the first virtual model replaced in the modifying step corresponds to the identified physical portion.

23. (Currently Amended) The system according to claim 21, wherein:
the portion of the first virtual model that is the deficient representation of the first physical portion of the physical teeth includes a finish line of the first virtual model;
the portion of ~~[[the]]~~a second virtual model that is the adequate representation of the first physical portion of the physical teeth includes a finish line of the second virtual model; and
the physical portion of the teeth includes a finish line of a prepared tooth.

24. (Currently Amended) The system according to claim 22, wherein replacing at least ~~[[a]]~~ the first 3D intraoral scan data of the identified portion of the first virtual model with a corresponding portion of the second virtual model, thereby generating the modified virtual model comprises:

removing the portion of the first virtual model that is the deficient representation of the first physical portion of the physical teeth;

registering the second 3D intraoral scan data ~~virtual model~~ with the first 3D intraoral scan data ~~virtual model~~; and

stitching the corresponding portion of the second 3D intraoral scan data ~~virtual model~~ that provides the adequate representation of the physical portion into the first 3D intraoral scan data ~~virtual model~~, thereby creating a modified first virtual model.

25. (Currently Amended) The method of claim 1, wherein the identified portion of the first virtual model that is a deficient representation of the first physical portion of the teeth, includes a representation of the first physical portion of the teeth before a material removal procedure and the corresponding portion of the second 3D intraoral scan data ~~virtual model~~ that provides an adequate representation of the first physical portion of the teeth includes a representation of the first physical portion after the material removal procedure.

26. (Currently Amended) The method of claim 1, wherein:
the obtaining, by the intraoral scanner, the second 3D intraoral scan data ~~virtual model~~ of the teeth with the computer system, includes: receiving the second 3D intraoral scan data of the teeth comprising scan data of the first physical portion of the teeth and scan data of a second physical portion of the teeth, the second physical portion being adjacent the first physical portion, and
wherein the scan data of the second physical portion is used to align the second 3D intraoral scan data ~~virtual model of the teeth~~ with the first 3D intraoral scan data ~~virtual model~~ before the modifying, by the computer system, the first virtual model by replacing at least the first 3D intraoral scan data of the identified portion of the first virtual model.

REMARKS

Upon entry of this amendment, claims 1, 4-11, 14-26 will be pending in the present application. Claims 1, 4, 7, 8, 10, 11, 14, 18, and 20-26 have been amended. Support for the amendments can be found in the specification as originally filed. Accordingly, no new matter has been added. Reconsideration is respectfully requested.

Interview Summary

Applicant thanks Examiner Mapar for participating in a telephonic interview on October 24, 2019, with Applicant's representative, Charles Hagadorn. The Examiner's rejections of the claims made in an Office Action mailed on July 26, 2019, and propose claim amendment to claims 1 and 10, similar to those submitted herein were discussed. Agreement was reached that the amendments would overcome the rejection and the Examiner indicated a high likelihood of allowability, subject to further search. Accordingly, Applicant has amended claims 1, 10, 11, 20, and 21 to include subject matter similar to that discussed during the interview.

Double Patenting

Claims 1, 4-11, and 14-22 were rejected on the ground of nonstatutory obviousness-type double patenting as being unpatentable over 9,299,192.

The rejection is acknowledged and will be addressed upon final resolution of the claims by, e.g., filing a terminal disclaimer, if necessary.

Claim Objections

Claims 7 and 10 were objected to because of informalities. Without commenting on or conceding the merits of the objection, claims 7 and 10 have been amended as helpfully suggested by the examiner. Accordingly, the objection to claims 7 and 10 should be withdrawn.

Claim Rejections – 35 USC § 103

Claims 1, 4-11, 14-22, and 24-26 are rejected under 35 U.S.C. § 103(a) as allegedly being unpatentable over Rubbert (U.S. Pub. No. 2002/0006217A1, hereinafter "Rubbert") in view of Paley (U.S. Pub. No. 2007/0172112A1, hereinafter "Paley") and Kriveshko (U.S. Pub. No. 2007/0236494A1, hereinafter "Kriveshko").

As discussed during the interview, without conceding the merits of the rejection, Applicant has amended the claims to include subject matter that the Examiner agreed would overcome the rejection. Accordingly, Applicant respectfully submits that claims 1, 4-11, 14-22, and 24-26 are allowable over Rubbert in view of Paley and Kriveshko.

Accordingly, for the reasons set forth above, withdrawal of the rejection of claims 1, 4-11, 14-22, and 24-26 under 35 U.S.C. § 103(a) is respectfully requested.

Claim 23 is rejected under 35 U.S.C. § 103(a) as allegedly being unpatentable over Rubbert in view of Paley and Kriveshko, and in further view of Babayoff (U.S. Pub. No. 2005/0283065, hereinafter “Babayoff”).

Claim 23 depends from allowable claim 21 and is therefrom allowable at least for its dependence on claim 21, and on its own merits.

Accordingly, for the reasons set forth above, withdrawal of the rejection of claim 23 under 35 U.S.C. § 103(a) is respectfully requested.

CONCLUSION

In view of the foregoing, Applicant believes all claims now pending in this Application are in condition for allowance. The issuance of a formal Notice of Allowance at an early date is respectfully requested.

Further, the Commissioner is hereby authorized to charge any additional fees or credit any overpayment in connection with this paper to Deposit Account No. 23-2415.

If the Examiner believes a telephone conference would expedite prosecution of this application, please telephone the undersigned at 206-883-2500.

Respectfully submitted,

Dated: October 28, 2019

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I hereby certify that this correspondence is being filed via
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By: /Hillary Pratt/

IN THE UNITED STATES PATENT AND TRADEMARK OFFICE

In re Application of:

Avi Kopelman

Application No.: 15/050,673

Filed: February 23, 2016

For: METHODS AND SYSTEMS FOR
CREATING AND INTERACTING
WITH THREE DIMENSIONAL
VIRTUAL MODELS

Customer No.: 107046

Confirmation No.: 2186

Examiner: Bijan Mapar

Art Unit: 2128

AMENDMENT

Mail Stop Amendment
Commissioner for Patents
P.O. Box 1450
Alexandria, VA 22313-1450

Commissioner:

In response to the Non-Final Office Action mailed July 26, 2019, please enter the following amendments and remarks.

Amendments to the Claims are reflected in the listing of claims beginning on page 2.

Remarks begin on page 10.